

EDITORIAL COMMENT

Dear readers,

The Editorial Board of the journal *Ecological Engineering and Environmental Protection* has the pleasure to present to your attention the new English language issue – the second for 2024. Quite intriguing and impressive with their content are the articles and reviews placed in the rubrics *Man and Biosphere*, *Technologies for Depollution*, *Bioautomatics and Bioinformatics*, *Ecology and Sustainable Agriculture*, *Forest Ecology and Biology* and *Radiation Ecology*.

In the first rubrics *Man and Biosphere* the readers will find very comprehensive data on the negative impact of transformers as key elements of the power system on the environment. Various aspects of this impact are described, including electromagnetic radiation, soil and water pollution, noise, fire risk and visual disturbances to the environment. This radiation can affect both the environment and human health. In addition, oil leakage from transformers can contaminate soil, groundwater and surface water, increasing the risk of fires and explosions. In addition, the article also discusses possible preventive measures that can significantly reduce these negative effects.

In the rubrics *Technologies for Depollution*, is considered the topic on biodegradation of carbon pollutants. A comparative analysis between results for removal of suspended solids and biodegradable carbon pollutants from pilot-plant experiments in two types of downflow filters is made. Their different role and location in technological schemes for advanced treatment of urban wastewaters is clarified. In another study, experimental results of the operation of descending biological aerated filters in two technological schemes for the treatment of primary settled domestic wastewater are presented. The author proves that with regard to inorganic forms of nitrogen, the nitrification-denitrification system achieves more than twice the reduction of pollutants compared to the nitrification-only scheme. At the same time, the increase in the total construction volume of the two-stage system is half as much due to the greater purification capacity of the anoxic reactor. This makes the two-stage scheme more economically efficient per unit volume of facilities. Important environmental problem is the large amount of sludge that is formed in wastewater treatment plants and the lack of drying fields for their stabilization. This necessitates the search for innovative approaches for the realization of the formed wastewater sludge. Therefore, the possibility of decontamination of wastewater sludge using the ADAPT stabilizer intended for waste treatment, manufactured by Devnya Cement AD, was investigated. The sludge was analyzed before and after treatment with agrochemicals and microbiological parameters. It was found that the most effective treatment with the dry stabilizer for a period of 20 days. The authors prove that the treatment of sludge with the stabilizer does not have a negative impact on their chemical and agrochemical characteristics.

In a mini review (rubrics *Bioautomatics and Bioinformatics*) the research in the field of two-stage anaerobic digestion process control implemented in 2021-2023 by an international research team is briefly presented. An algorithm integrating extremum search control with a composite non-recursive model controller (CRMFC) for output trajectory and process disturbance compensation in two-stage anaerobic digestion is developed. This makes it possible to obtain more accurate gradient and Hessian estimates, and allows for accelerating convergence to the extremum. The results are an important contribution to addressing the problem of trajectory tracking for two-stage anaerobic digestion processes in the presence of input saturation.

In the rubrics *Ecology and Sustainable Agriculture* an intriguing study on the synergy between fertilization and irrigation of agricultural crops is presented. The goal is to optimize agricultural production processes to achieve sustainable agriculture in climate change conditions. Multifactorial experiments with macronutrients nitrogen, phosphorus, potassium, silicon, and micronutrients zinc and boron are described. Crop rotation as the most important element of agricultural practice is explained and the stages and modules of precision agriculture are presented.

Two articles are included in the rubrics *Forest Ecology and Biology*. The role of the relief elements in the fertility of Brown Forest soils (Dystric-Eutric Cambisols) and its significance for the composition and productivity of forest stands is well elucidated. To investigate the forest vegetation properties of the soils, soil profiles are created at various altitudes, slopes, and expositions of the terrain. The authors demonstrate that with increasing altitude, the intensity of organic matter transformation in the soil decreases. The influence of slope on soil fertility is reflected in a reduction of soil depth and a decrease in the soil organic matter and total nitrogen content. Differences in hydrothermal conditions depending on the terrain exposition led to the formation of brown forest soils with varying fertility. In a second article the diversity of tree species in part of Sofia, Bulgaria are examined and a total of 91 species from 53 genera and 25 families are identified. Dominating in the area is *Fraxinus excelsior* representing 12.7% of the total number of trees. The genus *Fraxinus* is the most abundant, with five species accounting for 22.21% of all trees observed. In conclusion, the high prevalence of *Fraxinus excelsior* and its genus raises alarms about potentially increased risks of disease and environmental stress.

An evaluation of the radiation fields induced by the beam losses in the cyclotron vacuum tank is reported in article presented in the rubrics *Biology and Radiation Ecology*. For this purpose, it is performed simulations with the Monte Carlo particle transport and interaction code FLUKA. Simplified models of the cyclotron and the source of primary particles are implemented. The proton beam is modeled as an isotropic point source positioned in the center of the cyclotron vacuum tank. The article evaluates the distribution of radiation fields generated by the beam losses during cyclotron operation and after the end of an irradiation session. The effect of replacing parts of the shielding bunker walls with low activation concrete is also studied.

Enjoy reading the new issue of *Ecological Engineering and Environmental Protection* !

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Sofia

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